

PiXL Independence:

GCSE Chemistry – Student Booklet

KS4

Earth and atmosphere

Contents:

- I. Level 1- Multiple Choice Quiz – 20 credits
- II. Level 2 - 5 questions, 5 sentences, 5 words – 10 credits each
- III. Level 3 - Science in The News – 100 credits
- IV. Level 4 - Scientific Poster – 100 credits
- V. Level 5 - Video summaries – 50 credits each

PiXL Independence – Level 1
Multiple Choice Questions
GCSE Chemistry – Earth and atmosphere

INSTRUCTIONS

Score: /20

- Read the question carefully.
- Circle the correct letter.
- Answer all questions.

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1. The gas needed for respiration is:
 - a. Carbon dioxide.
 - b. Nitrogen.
 - c. Water.
 - d. Oxygen.

 2. The process by which this gas is released into the atmosphere is:
 - a. Distillation.
 - b. Evaporation.
 - c. Combustion.
 - d. Photosynthesis.

 3. One type of organism that produces this gas is:
 - a. Humans.
 - b. Animal.
 - c. Green Plants.
 - d. Anaerobic Bacteria.

 4. The early atmosphere was primarily composed of:
 - a. Carbon dioxide and ammonia.
 - b. Oxygen and carbon dioxide.
 - c. Water and oxygen.
 - d. Water and carbon dioxide.

 5. The greenhouse effect is caused by the gases:
 - a. Carbon dioxide, water vapour and methane.
 - b. Carbon dioxide and water only.
 - c. Carbon dioxide only.
 - d. Ozone.

 6. Carbon dioxide is associated with this environmental problem:
 - a. Global dimming.
 - b. Global warming.
 - c. Acid rain.
 - d. Suffocation.

7. Global dimming is caused by:
 - a. Carbon particles.
 - b. Carbon dioxide.
 - c. Sulfur dioxide.
 - d. Nitrous oxides.

8. Acid rain is caused by:
 - a. Carbon particles.
 - b. Carbon dioxide.
 - c. Sulfur dioxide.
 - d. Nitrogen.

9. Global warming can cause:
 - a. Sea levels to rise.
 - b. The world to get dimmer.
 - c. Buildings to weather.
 - d. The world to get colder.

10. Acid rain can cause:
 - a. Sea levels to rise.
 - b. The world to get dimmer.
 - c. Buildings to weather.
 - d. The world to get colder.

11. Global warming can be caused by:
 - a. Using wind power.
 - b. Burning nuclear uranium.
 - c. Burning fossil fuels.
 - d. Sulfur in fuel.

12. The three types of fossil fuels are:
 - a. Coal, oil and gas.
 - b. Coal, oil and wood.
 - c. Wind, solar and water.
 - d. Water, wind and biomass.

13. Water can be purified using.
 - a. Chlorine.
 - b. Bromine
 - c. Fluorine.
 - d. Iodine.

14. The first step in water purification is:
 - a. Dissolving the halogen in the water.
 - b. Evaporating the solution.
 - c. Filtering the water.
 - d. Condensing the gases.

15. Salt water can be distilled by:
 - a. Evaporating the water.
 - b. Filtering the water.
 - c. Condensing the water.
 - d. Fractional distillation of the water.

16. Ground water can be obtained by:
 - a. Drilling the rock and pumping the water to the surface.
 - b. Fracking.
 - c. Fractional distillation.
 - d. Carbon reduction.

17. Distilled water is:
 - a. Bottled H₂O.
 - b. Pure H₂O.
 - c. Mineral H₂O.
 - d. H₂O from the tap.

18. Carbon dioxide was trapped in:
 - a. Oceans.
 - b. Plants.
 - c. Oceans and sedimentary rocks.
 - d. The ozone layer.

19. Which of the following do scientists believe is responsible for producing the early atmosphere?
 - a. The Earth being very hot.
 - b. Green plants.
 - c. Oceans heating up.
 - d. Volcanic eruptions.

20. The formula for carbon monoxide is:
 - a. CO₂
 - b. CH₂
 - c. CO.
 - d. CH.

PiXL Independence – Level 2
5 questions, 5 sentences, 5 words
GCSE Chemistry – Earth and atmosphere

INSTRUCTIONS

- For each statement, use either the suggested website or your own text book to write a 5-point summary. In examinations, answers frequently require more than 1 key word for the mark, so aim to include a few key words.
- It is important to stick to 5 sentences. It is the process of selecting the most relevant information and summarizing it that will help you remember it.
- Write concisely and do not elaborate unnecessarily, it is harder to remember and revise facts from a big long paragraph.
- Finally, identify 5 key words that you may have difficulty remembering and include a brief definition. You might like to include a clip art style picture to help you remember it.

Example:

QUESTION:	Describe how an oxygen-rich atmosphere developed over time.				
Sources:	Website – http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/oneearth/damagetothenvironmentrev1.shtml https://www.youtube.com/watch?v=6Db2WAG-VVs				
	<ol style="list-style-type: none"> 1. The early atmosphere was primarily carbon dioxide, methane, ammonia and water vapour. 2. The Earth cooled, and oceans formed and carbon dioxide dissolved into them. 3. Green plants evolved. 4. They took in carbon dioxide and released oxygen by the process of photosynthesis. 5. Oxygen rose to 21% of the atmosphere and human evolved. 				
	Carbon dioxide	oxygen	Photosynthesis	Atmosphere	green

QUESTION 1:

Describe the greenhouse effect.

Sources:

Website –

1. http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/global_warmingrev1.shtml
2. <https://climatekids.nasa.gov/greenhouse-effect/>

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QUESTION 2:	Describe the potential effects of increased levels of carbon dioxide and methane on the Earth's climate and how these effects may be mitigated, including consideration of scale, risk and environmental implications.
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Sources:	Website – <ol style="list-style-type: none">1. https://science.howstuffworks.com/environmental/green-science/global-warming8.htm2. https://www.youtube.com/watch?v=kA1gl2kedWI
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QUESTION 3:

Explain the principles behind water purification.

Sources:

Website –

1. http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/water/purifying_water/revision/1/
2. https://www.youtube.com/watch?v=oX-imU_YxU0

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QUESTION 4:

Describe the principle causes and problems associated with carbon monoxide, sulfur dioxide and carbon particles.

Sources:

Website –

1. http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/rocks_metals/6_clean_air3.shtml
2. http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/fuels/oil_refining_fuelsrev3.shtml

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QUESTION 5:

Describe the process by which salt water becomes drinking water.

Sources:

Website –

1. <https://www.wikihow.com/Turn-Salt-Water-Into-Drinking-Water>
2. <http://www.docbrown.info/page01/AqueousChem/AqueousChem1.htm>

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PiXL Independence – Level 3

Science in the News

GCSE Chemistry – Earth and atmosphere

INSTRUCTIONS

Fake news

Sensationalised news stories have been around for some time, but with the mass growth of social media, the problem seems to have grown in recent years. At the very least, the US Presidential election has certainly highlighted the impact that misleading information can have. www.tiny.cc/fakenews2

At home, the Brexit vote also suffered from the circulation of misleading news stories www.tiny.cc/fakenews3

Therefore, the ability to identify real information, track it back to the source article and make your own judgement is a very important skill. This activity will help you develop that skill.

What is climate change?

Discussion piece: <https://climate.nasa.gov/evidence/>

Science article: <https://climate.nasa.gov/evidence/>

Real article: <https://www.scientificamerican.com/article/science-behind-climate-change/>

Task 1:

You need to produce a 1 page essay on the science behind climate change.

Essay section	Activity
Introduction	Define climate change.
Describe	Describe the process of global warming.
Explore	Look into the impacts of global warming.
Evaluate	Evaluate the evidence provided to support the theory of global warming. Discuss both the advantages and disadvantages and give an overall opinion.

Where did the oxygen come from?

Discussion article: <https://www.quantamagazine.org/simple-bacteria-offer-clues-to-the-origins-of-photosynthesis-20171017/>

Real piece: <https://scijinks.gov/atmosphere-formation/>

Real piece: http://www.esalq.usp.br/lepse/imgs/conteudo_thumb/Life-and-the-Evolution-of-earths-atmosphere-2.pdf

Task 2:

You need to produce a 1 page essay explaining how our atmosphere developed.

Essay section	Activity
Introduction	Describe the composition of the atmosphere today.
Describe	Describe the process by which it evolved.
Explore	Compare the different atmospheres, early and now.
Evaluate	Evaluate the evidence provided to support the theory of development. Give both sides of the argument and then your overall opinion.

PiXL Independence – Level 4

Scientific Posters

GCSE Chemistry – Earth and atmosphere

INSTRUCTIONS

Scientific Posters

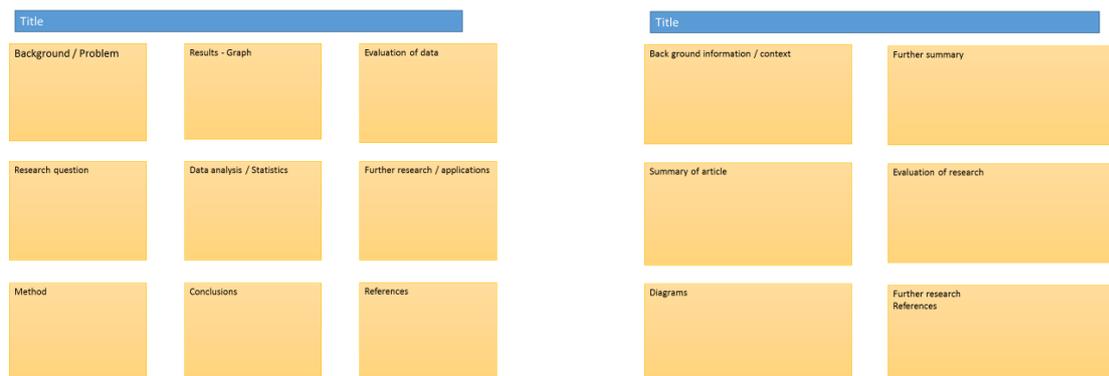
Scientists communicate research findings in three main ways. Primarily, they write journal articles much like an experiment write up. These are very concise, appraise the current literature on the problem and present findings. Scientists then share findings at conferences through talks and scientific posters. During a science degree, you would practice all three of these skills.

Scientific posters are a fine balance between being graphically interesting and attracting attention and sharing just the right amount of text to convey a detailed scientific message. They are more detailed than a talk and less detailed than a paper.

Use this information to help structure your poster – www.tiny.cc/posterskills (that's Poster Skills not Posters Kill!) More detailed guidance is available at : www.tiny.cc/posterskills2

Creating your poster

It is easiest to create a poster in PowerPoint; however, you need to add custom text boxes rather than using the standard templates.



Posters need to be eye catching, but readable from a distance. If you use PowerPoint, start with a 4:3 slide (for easier printing, it can then be printed on A3) and use a 14-16 pt font. The first box could be larger to draw people in. You can use a background image, but pick a simple one that is of high quality. Select 'text box fill' and select 'change the transparency' to maintain the contrast and partially show the picture.

You can experiment with different layouts and you should include images. Avoid a chaotic layout, posters are read from top left column downwards.

Remember to include the authors and references.

Finally, look at the examples given on the University of Texas website which also offers an evaluation of each www.tinyurl.com/postereg

Pollution

Background

Climatic change is major discussion topic for the G20 summit and yet many countries do not want to work together to bring about change. Countries need to look at the ideas behind the climate crisis. How can we manipulate the gases in the atmosphere to bring about a change ensuring the survival of our world?

Source articles

<https://www.nationalgeographic.com/environment/global-warming/pollution/>

http://www.bbc.co.uk/schools/gcsebitesize/science/21c/air_quality/chemicals_airrev2.shtml

<https://ncar.ucar.edu/learn-more-about/pollution>

http://www.bbc.co.uk/schools/gcsebitesize/science/aqa_pre_2011/rocks/fuelsrev5.shtml

Use other sources as necessary.

Task:

Produce a scientific poster on pollutants to our atmosphere.

Recall	State the different types of pollutant.
Describe	Describe the effects of the pollutants.
Compare	Compare the similarities and differences between how the pollutants impact our atmosphere.
Evaluate	Evaluate the methods we employ to reduce their effects. The advantages and disadvantages.

PiXL Independence – Level 5

Video summaries

GCSE Chemistry – Earth and atmosphere

Cornell Notes

At A level and University, you will make large amounts of notes, but those notes are only of use if you record them in a sensible way. One system for recording notes is known as the Cornell notes system. This method encourages you to select relevant information, rather than trying to write a transcript of everything said. More importantly, it forces you to spend a few minutes reviewing what you have written, which has been scientifically proven to aid learning and memory retention.

The ideal is to write everything on one page, but some students may prefer to type and others will to handwrite their notes. Whichever option you use, remember the aim is to summarise and condense the content with a focus on the objectives that you are trying to learn and understand.

There are three main sections to the Cornell notes

- 1 **Cue/ Objectives** – This can be done before or after the lecture. You may have been provided with the objectives or you may need to decide what they were or you may want to make the link to your learning if this is an additional task or lecture you are viewing, such as this video.
- 2 **Notes** – In this space you record concisely, simply the things you are LESS likely remember - **The NEW knowledge**.
- 3 **Summary** – The most important step that is carried out after the lecture or video. This helps to reinforce learning.

Background

The following short talks present two topics that link to your learning. The first looks at 15 ways we, as individuals, can address climate change. The second video discusses how we can look at the problem differently, trading economic growth for financial stability.

Source article:

Video 1 – Averting the Climate Crisis

Ted talks clip: https://www.ted.com/talks/al_gore_on_averting_climate_crisis

Video 2 – Climate Change is here. Here's how we adapt

Ted talks clip:

https://www.ted.com/talks/alice_bows_larkin_we_re_too_late_to_prevent_climate_change_heres_how_we_adapt

Task:

**You need to produce a set of Cornell notes for the video given above.
Use the following objective to guide your note taking, this links to your learning.**

- 1 Discuss what the climate crisis is and how humans have impacted it.
- 2 Discuss why we can address the issues looking at new and established ways.

Objectives
What are the main learning outcomes that have been shared with you?
This will help guide you to taking the RIGHT notes during the video.

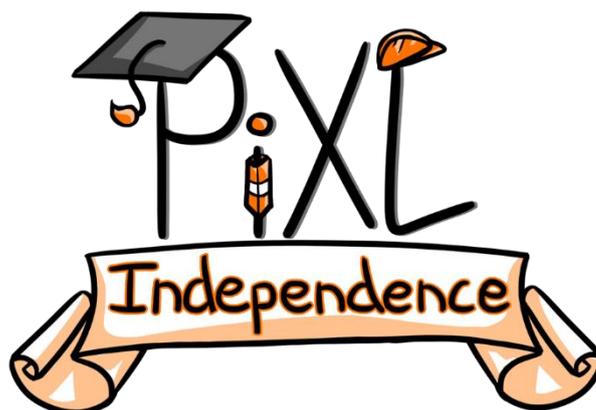
Title
Date

Sketch down note and key words
Do not write in full sentences whilst you listen, put quick sketches, single words, mind maps, short hand etc.
To help train you for university, try not to pause the video because you could not pause a live lecture (However, a lecture may give more natural pauses for you to catch up).

Summary (after the video)
What are your main points of learning from this video.
This is your chance to make sense of your notes.
Make clear connections to the things you need to know

Objectives:	Title:
	Date:
Summary:	

Objectives:	Title:
	Date:
Summary:	



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